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Building Florida Agriculture For Fifty Years

Fla. U. Agricultural Experiment Station

Contributions Of The University Of Florida Agricultural Experiment Station Related In Connection With Its Golden Anniversary Celebration, October 15th To November 15th, 1938 . . .

By J. FRANCIS COOPER

When you drank your orange juice this morning, or ate steak for your luncheon today, did you, perchance, give a passing thought to the long hours of toil back of the production of the oranges which furnished the juice, or the steer which was hapless enough to be made into steak? The chances are good that you did not once think of the grower or the cattleman.

But at the University of Florida in Gainesville, there exists an institution, with branches in various parts of the state, which has been constantly thinking of the grower, the cattleman, the general farmer, the truck farmer, and the public as well, for half a century. The Agricultural Experiment Station has been on the alert to aid Florida farming, and indirectly Florida business in general for fifty years. It is celebrating its Golden Anniversary this year, an event which comes only once, and which is a long time about getting here.

While Nature was munificent in her gift of favoring conditions to the farming areas of Florida, she also provided offsetting elements on a prodigal scale. Climate, location, rainfall and soil advantages must contend with disadvantages composed of crop enemies, marketing difficulties and related obstacles.

Means for overcoming the handicaps of Florida agriculture can be efficiently developed by few farmers, acting independently. Nor can many of them do the experimental work required to determine how the state's agricultural assets may be best utilized. A central research agency is essential for these purposes.

The Florida Agricultural Experiment Station was established to serve Florida farmers in this manner. Founded at Lake City in late 1888, it was removed to Gainesville during 1905 and 1906, when the University of Florida began its existence at that place. Branch stations since have been located at Belle Glade, Homestead, Lake Alfred and Quincy.

Field laboratories are maintained in Bradenton, Cocoa, Hastings, Lakeland, Leesburg, Monticello, Sanford and Plant City. Studies frequently are conducted at other points. (Parenthetically, it may be stated that this observance is not intended to stir up sentiment in favor of expanding the facilities of the Station.)

Funds for the support of the State Agricultural Experiment Station are received from the treasuries of both Florida and the United States, with joint supervision of numerous projects.

Agriculture in Florida is most diversified, the climate ranging from subtropical to temperate, hence the problems are highly varied. Conditions differ radically from those found in other states, and unfortunately much of the agricultural research elsewhere does not apply here.

Delving into the realm of the unknown and emerging with verified knowledge, the Florida Experiment Station for 50 years has kept pace with the demands of farmers and growers for practical information based on scientific findings.

Some have estimated that this research is saving and earning some 25 million dollars for Florida farm-

(Continued on page 20)

1, Frost Protection
2. Fla. U. Agricultural Experiment Station

Frost Protection Service . . .
. . . Of Great Value To Growers

Unique among the many different branches of endeavor of the Florida Agricultural Experiment Station is that of its special weather reporting and frost service established in 1935 and operating from the field station at Lakeland. Unique, too, among the work of experiment stations throughout the United States is this special service since no other experiment station has yet offered to its public any service at all comparable with our own. In this respect Florida leads the field.

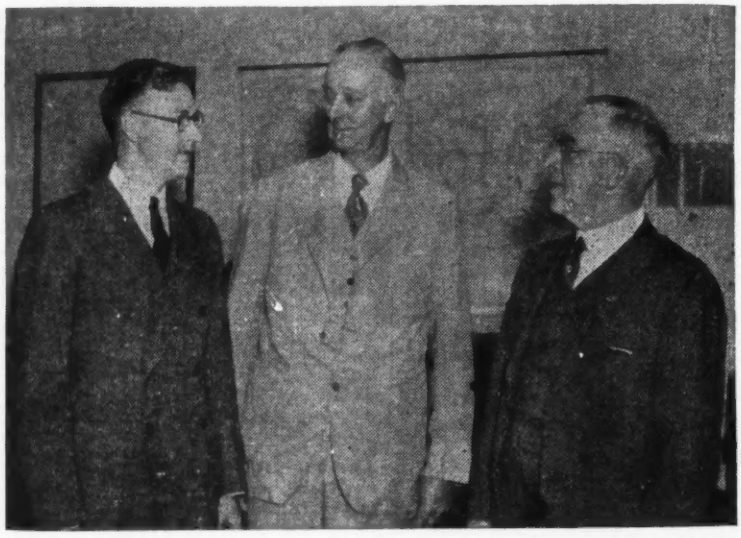
One may well surmise there was a very good reason why the needs of our agriculturists necessitated the creation of this horticultural protection work, with functions so radically different. There was. It was planned to assist Florida farmers to materially reduce or even to elimnate entirely the tremendous losses caused by frost. During the past fifty years, so the average figures show, the pockets of Florida citrus and truck growers have been pilfered by this archenemy of subtropical horticulture to an amount of several millions of dollars annually. It was high time, so reasoned the Florida Agricultural Experiment Station, that this continual insiduous looting should be halted.

Careful survey of the frost situation revealed some astonishing facts. First, that many millions of dollars had been lost through the unwise planting of citrus in sections where the normal frost hazard was such that the trees were killed or seriously injured every few years. A detailed temperature survey was needed to show the areas where, in the long run, it would prove to be unprofitable to attempt to develop citrus groves; also to show the areas suitable for growing tender winter truck. Second of these facts was that the Florida growers were spending large sums of money on frost protection without the necessary technical knowledge essential for success.

Inadequate and inefficient equipment was installed in many groves and the firing handled in such manner as to indicate total lack of understanding of the problem. Such money spent in a good cause was lost with the crop it was designed to protect so that those who were making an honest effort to help themselves were being penalized because of lack of technical direction. Third, so the survey revealed, was the established need of an adequate and dependable frost warning system without which it is impossible to successfully carry on any program of frost protection.

Armed with these facts Federal and State legislators lost no time in securing from their respective governments co-operative funds necessary to establish in 1935 a service in horticultural protection in Florida. Five men, technically trained in weather forecasting and modern frost protection work, were obtained from the United States Department of Agriculture, Weather Bureau, and the operating budget was sufficient to begin intensive work in the citrus area of the central Peninsula. This new service was highly successful from the start and in even the first year of its operation resulted in savings to Florida growers many times its modest cost. This new service was so well received, in fact, that the growers in the sections it was not possible to cover were so persistent in their demands for participation in its benefits at the next session of the legislature additional State and Federal funds were secured which made possible its extension in 1937 to cover the agricultural area of the entire Florida Peninsula, and the technical staff of the Station was increased by the addition of five more weather and frost experts secured by co-operation with the U. S. Weather Bureau.

Much as we would like to tell you about the remarkable frost warning system our new service has organized it is perhaps unnecessary to say much about it. No Floridian with a radio has failed to listen at least to some of the two daily temperature bulletins broadcast on frequent regular schedule by all the commercial radio stations on the Peninsula during the winter season of frosts and freezes. No one who has followed these bulletins (and who hasn't?) could fail to be impressed by the total lack of weasel words in the forecasts. What was always heard was a clean-cut direct statement of sky condition, wind, and the **exact** lowest temperature to be experienced at each of 77 special temperature stations spread in a network over the entire Florida



Left to right: Eckley S. Ellison, Meteorologist, in charge, Federal State Horticultural Protection Service, Lakeland, Florida; Dr. Wilmon Newell, Provost for Agriculture, Florida Experiment Station; late Dr. Willis Ray Gregg, Chief U. S. Weather Bureau.

Peninsula in the cold spots of each agricultural area. Even the time the lowest temperature was to be reached was given as well as the time dangerous temperature conditions would begin and end. A forecast is one thing; its verification is another. Best of all these special forecasts proved to be remarkably accurate and even those who regarded them skeptically at first soon learned to listen for and depend upon them. The timely information in these forecasts have already saved thousands of dollars for Florida growers, and the good work is only just beginning.

Forecasting frost is only one of the several services of this new organization. Already the temperature survey is under way and valuable records have been obtained for three seasons. Last year the frost service operated 280 strategically located temperature survey stations on the Peninsula, including stations on towers to explore air strata near the surface. This year 60 additional stations will be placed in the field. Thus are Florida's warm and cold spots being determined and the ground work laid for accurate calculation of the costs of modern frost protection in our state. Of untold benefit to shippers is the fact that from the records of these stations accurate estimates of damage to citrus can be made within a few days after a serious frost has visited the groves. Other services include research work on Florida frost problems and a personal service to growers who need technical information and advice in the installation of equipment for frost protection work, including free testing of all thermometers used in the groves and truck gardens.

It is with considerable pride that the Florida Agricultural Experiment Station points to the Federal-State frost service, not so much from a feeling of achievement but from being so instrumental in providing at small cost a much needed and greatly used personal service to Florida growers; a service which can so greatly assist in reducing the tremendous frost and freeze losses sustained by our agriculture. The prosperity and welfare of our growers is of more concern to us than our pride of accomplishment.

IF suffering with Piles, I want to help you. Drop me a line explaining.

FRED C. WHITNEY

317 6th Ave., Des Moines, Iowa

Government And Industry . . . Join Hands

A nine-day conference between citrus leaders of Florida, California, Texas and Arizona, concluded in Washington on October 24, resulted in a broad program for orderly marketing of the biggest citrus crop on record.

At the conference, the citrus leaders from the several states had the advice and co-operation of government officials who made it plain that while the solution of marketing problems was largely in the hands of the producers themselves, that nevertheless the government stood ready to assist as far as possible.

The program as finally adopted included the following major points:

1. A government agreement to purchase through its Surplus Commodities corporation 3,000,000 boxes of oranges and the equivalent of 5,000,000 boxes of grapefruit for distribution to needy persons. The cost was estimated at $10,000,000.

2. An industry program, without government subsidies, to keep all low grade fruit off the market. For each box bought by the government, the industry must divert a box to some non-competitive use, such as the manufacture of fertilizer, livestock, feed, or oil.

3. Adoption of a Florida marketing agreement to govern out-of-state shipments, continuation of existing agreements in Texas and the California-Arizona area, and establishment of a new California-Arizona agreement to control the grade and size of marketed grapefruit.

4. An appeal to canneries to place a minimum price of 20 cents a box on fruit purchased for canning and to limit purchases to high grade fruit.

5. A campaign, conducted through the secretary of agriculture, for an emergency reduction in citrus freight rates.

6. A study of methods to reduce handling costs.

This program which must now be submitted to growers, shippers and caners for their approval, followed days of discussion and bickering which at times threatened to disrupt the gathering.

Government purchases will begin as soon as practicable and will continue until July 1, 1939. Purchases will be made in territories where the need for such service seems greatest, and prices will be based upon the previous week's market.

Despite the large quantity of fruit to be diverted from sales channels, the government estimates that shipments will be far in excess of last year. Production of grapefruit and winter oranges was estimated to be 15,000,000 boxes above last season's production. With a heavy crop of California Valencias anticipated, the citrus surplus for the year was placed at 20,000,000 boxes more than a year ago.

Just how soon a Florida marketing agreement can be worked out, approved and put into operation is problematical. That such an agreement is badly needed seemed to be agreed by all interests at the conference. That it should be speedily put into effect if it is to be helpful in controlling distribution of the present crop seems to be the general feeling of those at the conference. The agreement outlined at the conference for the Florida area provides for regulation of grade and size of fruit to be shipped out of the state, along the lines of similar agreements now existing in Texas and the California-Arizona areas.

Florida shippers and canners will be asked to promptly approve the Washington agreement.

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Fifty Years Of Plant Pathology Research . . .

W. B. Tisdale, Plant Pathologist, Florida Experiment Station, Briefly Tells History of Problems Which The Department Has Had To Combat During Its First Half Century And Of Numerous Solutions Found . . .

W. B. TISDALE

Plant diseases in Florida, as in other states and countries, have always presented important problems in the development of agriculture. All plants have diseases, and from time that man began to domesticate by cultivation the wild plants that suited his needs and to introduce others from foreign countries, he must necessarily have observed and considered the diseases that robbed him of part or all of the fruits of his labor.

Not until the estblishment of the Experiment Station in 1888, however, did Florida farmers have any source of information concerning the cause and prevention of these losses. Prior to that time the farmer generally considered the failure of his crops as a natural phenomenon over which he had no control, and did little or nothing to remedy the condition. Furthermore, at the time the Experiment Station was established the science of Plant Pathology was not organized in the United States, and, although considerable information had been obtained on the causes of diseases in plants in the United States and European countries, very little was known about conditions under which they occured and of practical means for their prevention. Consequently, at first the Experiment Station workers did not know what problems confronted them.

With the beginning of research work at the Experiment Station, however, it was found that plant diseases had to be reckoned with in all field experiments with crop plants. The investigators also soon found that plant diseases were important problems of the grower. Since there was no Plant Pathologist available during the first 20 years, the Botanists and Horticulturists devoted a part of their time to a study of plant disease problems. Even with this small number of investigators during that period information was obtained on certain plant diseases that put agriculture on a more stable and profitable basis. They learned that rust caused the failure of wheat in the experimental plots, and since the prevailing weather conditions were quite favorable for the development of rust, and since no possible means of control was known wheat was soon considered an unpromising crop plant for the State. Foot rot of citrus trees was an important disease at that time. By careful observations and experimentation it was found that certain varieties of citrus were more resistant to this disease than others, and the problem was solved by using the resistant varieties as understocks.

W. B. TISDALE
Plant Pathologist, Florida Experiment Station

During this period fungus enemies of citrus whiteflies and San Jose scale were discovered, and it was realized that here was an important natural ally of the grower in his never-ending battle against pests. Methods were perfected for artificially culturing and disseminating these friendly fungi, and growers have been supplied with cultures annually by the State Plant Board at cost of production.

Other valuable contributions in plant pathology were the determinations of the causes of several foliage diseases of strawberries and vegetable crops and the development of spray programs for reducing the damage caused by them.

The first plant pathologist was appointed in 1908 and two additional members were added to the staff a few years later. During this period, 1908 to 1921, a definite program of research was employed on the most important plant disease problems, and the plant pathologists devoted their full time to the study of plant diseases. As a result, they obtained extensive information on the cause and control of various plant diseases which they published for the benefit of the growers. Extensive study was made of diseases of citrus. Citrus scab, scaly bark, stem-end rot, melanose and die-back received special attention. Altogether eight bulletins were published on the research work done on citrus diseases. In addition to these, four

bulletins were published on diseases of vegetable crops, including lettuce drop, cucumber rot, tomato diseases and other important diseases of vegetable crops. Diseases of the fig and pecan each received investigation and the results obtained were published in bulletin form.

Beginning with the rapid expansion of agriculture in 1919 there was an increasing demand for assistance in combatting the diseases of special crops that were planted on an extensive scale in certain localities of the State. Money was appropriated and the plant pathologists were appointed to give this service, and during the period 1922 to 1931 the staff of the department was increased to 15 members. Most of these workers were located at the branch stations and field laboratories in various parts of the State so they could obtain more accurate information on the conditions under which the particular diseases occur and in cooperation with the growers concerned could develop practical means of control. During the period, 1922 to 1938, numerous plant disease problems have been solved, without which in some instances cultivation of the crops would have been discontinued in the areas involved. Outstanding among such accomplishments were the investigations which aided the State Plant Board in the eradication of citrus canker and cocoanut bud rot, the control of blackshank of tobacco, bacterial wilt of potato, nailhead rust of tomato, Fusarium wilt of watermelon, crimp and root rot of strawberry, eyespot and mosaic of sugar cane. Methods evolved for controling these diseases are necessarily variable, depending upon the cause and nature of the disease. Because of certain characteristics of the organisms, citrus canker and cocoanut bud rot were eradicated, the most satisfactory procedure when practical. In the case of nailhead rust of tomato, Fusarium wilt of watermelon and blackshank of tobacco, resistant strains of the plants were developed through breeding and selection that would grow in spite of the presence of the parasite. Brown rot of potato has been successfully controlled by treating the soil with sulfur to kill the parasite and then adding lime to make the soil suited for the plant needs. A root rot disease of strawberry was found to be caused by high soil acidity and it was prevented by adding lime to the soil. Besides these, the causes of numerous other plant diseases have been determined and methods have been evolved for preventing or greatly reducing damages caused by them. Citrus blight, a mysterious disease that has puzzled growers in certain sections of the East Coast for years, was found to be due to unfavorable soil and water conditions. Methods for treating the seeds have been ascertained that will prevent or greatly reduce the damage caused by seed-borne parasites of cucumber, watermelon, tomato, eggplant, potato and other crops. By supplementing field spraying with a borax bath of the fruits immediately after picking, Phoma rot of tomatoes has been greatly reduced.

Spray programs have been worked out that will successfully control melanose and scab of citrus, and blights and leaf spots of most of the other important fruit and vegetable crops. This information has been published by the Station and made available to the farmers. New disease problems arise with the introduction of new crops, with changes in cultural practices and because of the purchase of diseased seed.

Because of the variations in soil and climatic conditions under which crops are grown, a method of plant diease control that proves successful in one section of the State is often ineffective in another section. For the same reason certain diseases attack a given crop in one locality and do not appear or are of minor importance with the same crop in other localities. This makes it necessary to work out means of control for the particular locality, which sometimes results in variation of the method or program for each disease. Furthermore, this explains why it is necessary to continue working with the same disease for several years before satisfactory control measures can be developed.

At present there are 28 plant disease projects under investigation in the State. These include only the principal unsolved diseases of the major crops. Several other minor problems also are under investigation, and there are others that need study. As soon as conclusive information is obtained on one problem, another one is selected to take its place.

The department of Plant Pathology is a service department of the state's agriculture and renders service directly to the grower and through cooperation with other departments and the Extension Service. With the demand for reduced acreage, farmers are becoming more interested in producing good yields of the best quality so they can get top prices for the crop. Since the farmers have learned that plant diseases impair the quality of farm products in addition to that destroyed, thereby reducing the net returns, they look to the plant pathologists for a solution of these problems. The benefit the farmers derive from the use of the various disease control methods depends upon the thoroughness of their application.

Research in Plant Pathology during the past 50 years has solved many plant disease problems, resulting in significant changes in farming methods and farm management. All of this has encouraged the farmers to plant their programs more carefully in an effort to produce the maximum yield of the best quality at the lowest cost. The value of this research to agriculture is difficult to estimate in dollars and cents, but some have estimated that on a conservative basis it would amount to several million dollars annually.

WHITE BECOMES SALES MANAGER

Appointment of Stacy White as sales manager for American Fruit Growers Inc., Florida Citrus Division, was announced by R. B. Woolfolk, vice president of the company. Mr.

White, who has been active on the sales desk for several years, took over his new duties immediately.

Having been with AFG for twelve years, Mr. White has worked up to his present important post from his first job in the accounting department where he started in Dec. 1926.

Always a conscientious worker, he has made many friends within his own organization as well as among members of the trade, growers, shippers and others connected with the fruits-vegetables industry. His experience has included various other deals besides citrus, for during the summer months he has been active in the Charleston, S. C., vegetable deal, at Hagerstown, Md., in apples and in peaches in Colorado and Arkansas and also in the big peach deal at Ft. Valley, Georgia. His citrus experience has been complete for the reason that he has worked up from the bottom.

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with which is merged The Citrus Leaf
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FLORIDA EXPERIMENT STATION

The Citrus Industry in this issue devotes considerable space to articles covering the varied activities of the Florida Agricultural Experiment Station, which is just now celebrating its fiftieth anniversary.

No institution in the state is of greater importance to the citrus growers and other horticultural interests of Florida than the Florida Agricultural Experiment Station, and it is fitting that its semi-centennial anniversary should be appropriately observed.

That the work and accomplishment of the Experiment Station is greatly appreciated by the growers of citrus fruits is abundantly shown by the many expressions of commendation, a few of which The Citrus Industry is pleased to present.

It gives this publication much pleasure to join with other friends of the workers at the Experiment Station in observance of the golden jubilee of this most important institution.

FOUR-STATE CONFERENCE

The four-state conference of citrus growers in Washington, just closed, promises to be helpful to the citrus growers of Florida, California, Texas and Arizona, although some of the things hoped for were not accomplished.

One outstanding accomplishment of the conference was the agreement of government agencies to purchase 3,000,000 boxes of oranges and 5,000,000 boxes of grapefruit to help relieve the pressure of a record breaking crop. The fruit thus to be purchased by the government for distribution among the needy, will consist of first and second grade fruit, the price to be governed by the average market price for the week preceding the purchase. It is estimated that the government purchases will aggregate $10,000,000.

An effort is to be made to keep all low grade fruit off the market, diverting all but first and second grade fruit to other channels, such as fertilizer products, livestock feed, oils, etc.

Canners will be asked to purchase no low grade fruit for canning purposes and to establish a minimum price of 20 cents a box.

For each box of fruit purchased by the government, the industry will be required to divert a box of low grade fruit to other channels.

Florida is asked to adopt a marketing agreement covering out-of-state shipments, similar to agreements now in effect in Texas and the California-Arizona field.

While Florida representatives at the conference did not get all they desired, the conference accomplished much that was worthwhile, not the least of which was the insight each producing section got into the problems of the others.

PLAN SALES DRIVE

The biggest nationwide sales drive on oranges and grapefruit in history has been set in motion by citrus producers and major agencies of distribution. The drive will enlist retail outlets numbering nearly a quarter of a million on behalf of the three major producing areas of the country and will continue from Thanksgiving through the winter.

Chain stores, independent grocers, drug stores, restaurants, five-and-ten-cent stores and others will partake in the drives, which will consist of three ten-day periods beginning in November, January and March.

With the largest citrus fruit crop on record, some such steps are necessary to move the enormous crop at anything like profitable prices to the growers. Leaders in the industry believe that the drives contemplated will do much toward stabilizing prices and increasing consumption.

FIVE-CENT CITRUS JUICE

A movement of much interest to citrus growers of the state is that which has for its goal the sale of orange and grapefruit juice by hotels, restaurants, drug stores and other refreshment places at the uniform price of five cents for a large glass.

The movement is meeting with general cooperation on the part of these establishments and should do much toward increasing the sale of citrus juices while at the same time building good will among the many winter visitors to Florida.

Another movement similar in character, is that which aims to supply school pupils of the state with citrus juices free of charge. This plan contemplates the donation of third grade fruit to the schools, the fruit to be brought from the groves by school lads, extracted by the pupils and supplied to all pupils in generous quantities without charge.

Both of these movements should be of benefit to the growers, should build good will for the state and the industry, and prove a health-giving factor in the lives of school children.

THIRD GRADE FRUIT

The proposal to eliminate the shipment of third grade fruit from all producing areas is one which should meet with unanimous approval.

If put into effect, this proposal will stimu-

(Editorial Concluded on Page 26)

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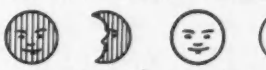

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Fla. U. Agricultural Experiment Stations

"Trouble Shooters" For Florida Farms

Experiment Station Handles Enormous Number of Inquiries — More Than 75,000 Communications Issued In Recent Years, In Addition To Information and Assistance Tendered By Station Personnel . . .

"Trouble Shooters" serve the people in countless ways. They are forever on the go for some useful purpose. Day and night, week by week, month after month, year in and year out, they faithfully stand ready to answer calls. Originally the term was applied mostly if not wholly to employees of utilities based on electricity. Telephone and telegraph lines, street car systems, power and light plants first introduced "trouble shooters" to the public. Now they are engaged in almost every form of commercial, industrial or professional activity depending upon satisfied clients or customers for existence.

Staffs containing numerous "trouble shooters" are found in the state farm service agencies affiliated under the College of Agriculture at the University of Florida. Calls for emergency assistance reach the headquarters in Gainesville almost every day. Frequently it is the case that these require attention in person by an expert on the conditions causing the problems to arise. Many of the requests can be handled, however, through the United States mails. Letters in vast numbers are therefore received and answered.

Volume of first-class mail handled in the offices of the State Agriculture Experiment Station and Agricultural Experiment Service during the course of a 12 months period is surprisingly large. In a typical recent year the total number of communications exceeded 75,000, that were delivered under first-class postage to the two affiliated institutions. Only about 10 per cent were official in character, issuing from federal or state departments associated with the activities, directly or indirectly.

Requests for information which could be furnished in the form of bulletins or other printed matter composed approximately 50 per cent of the total incoming mail. Forty per cent, or thereabouts, approximately 30,000 letters all told required specific answers at the hands of staff specialists. In replying thereto, these staff members became "trouble shooters" in the fullest sense. Repeatedly, situations were outlined so serious in nature that recommendation by telegraph or telephone, on a collect basis, were urged in the communications received.

Problems of every conceivable type were presented in the appeals for assistance. Inquiries for advice based on research featured the correspondence addressed to the Experiment Station. Confidence in the fidelity of the findings on which replies were predicated was both expressed and implied. Appreciation for the facilities placed at the command of the writers, by state and federal cooperation, was often voiced in no uncertain terms.

In seeking help as regards the proper treatment for an ailing pig which was a part of a project he was working on, a 4-H boy's club member gave evidence that for him the little hog had all the importance attached to his valuable 40-acre grove by a citrus grower who wanted help because of an insect or disease attack. Chickens not behaving just right clearly gave as much concern to a farmer's wife as the purebred heard of cattle with which he was having trouble gave to a neighbor.

Entomology department in the State Experiment Station, dealing with insect pests and their control, probably has the largest quantity of appeals for aid during the fruit and vegetable growing seasons. Agronomy, chemistry and soils, horticulture, and plant pathology come close behind, and each of these doubtless is in the lead for certain periods. Division of the work devoted to animal husbandry possibly records the highest year-round average, indicating the widespread interest in livestock raising and poultry keeping.

Farmers from far and near seek through the state agencies to find out about a multitude of products raised in Florida. Upwards of 15 per cent in the classification of letters needing special answer originated outside of the state of Florida. Wording of the communications, in instance after instance, makes it clear that the writers are contemplating removal here sooner or later. "So they want to know how our crops grow," as one farm journal put it.

Letters from the folks who have their homes on Florida farms nevertheless compose the bulk of the State Agricultural Experiment Station correspondence, through which the "trouble shooters" are called into action. "How can I apply borax to celery that is cracking?" writes one trucker. "Is it cholera my hogs have?" inquires a livestock farmer. "How can I best control whitefly in my grove?" asks a citrus grower. "Tell me what will rid my house of ants," implores a pestered housewife.

And so on and on, in request after request, appeal upon appeal, through communications that multiply from tens into the hundreds and thence increase until they must be counted in the thousands. They come from northwestern counties even unto the Perdido river, and out of the southeastern areas, all the way to Key West, and originate in the whole of the intervening territory, including that lying between Fernandina and Fort Myers.

When the letters arrive and receive the consideration of the specialists within whose knowledge is encompassed the available data on the difficulty described by the correspondents, a "trouble shooter" is assigned to the task of furnishing advice and aid. Under normal circumstances, answer by mail will be satisfactory, frequently a wire or phone message must be utilized, sometimes a personal visit is demanded.

"Trouble shooters" working in and out of the Florida Agricultural Experiment Station and kindred organizations located at Gainesville thus have become a supremely important factor in the farming endeavor of the state. So busy are these people that the phrase, "They also serve who do but stand and wait" is seldom of application to them.

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Enlisting Nature In War On Pests

Nature frequently seems to array herself in opposition to husbandmen seeking sustenance from the soil. At times it appears that she is set on bringing plague and curse to bear on his efforts. Production of crops at a profit is rendered difficult when the rains come too fast and furiously. No less of a handicap exists in periods of extreme drought. Insects and diseases engage in nefarious and destructive practices throughout the life cycle of useful plants. The farmer and grower ever must fight natural enemies of his plantings.

Yet Nature has her moods of friendliness. In a beneficent role, often she comes to the aid of man. Insects and fungi are provided by her which prey upon pests and drive out disease. If natural control had not been discovered in many instances, the spray and dusting bill of Florida farmers and growers would be immensely greater than at present. Nature has plagues for the plagues she sends, if humankind is but keen enough to learn what they are.

Fungi of the type the scientists describes as "entomogenous" now afford Florida citrus growers a means of controlling whiteflies and scale-insects. They prevent damage in fabulous sums to grapefruit, lemon, lime, orange and tangerine trees. Loss of fruit is lessened or prevented when these beneficent fungi are actively on the job. Research was required, however, to uncover their usefulness.

In 1878, a small white-winged insect was observed in greenhouses at Washington, D. C. While the newcomer was present in considerable numbers, no one knew what it was or whence it had arrived. Seven years later the same little bug was seen in great swarms among the trees composing Florida citrus groves. An entomologist, Ashmead, gave the invader a scientific name.

Whiteflies, as commonly they were called, soon became a serious pest of citrus. Means of control that were tried out proved altogether inadequate and infestations spread rapidly. Growers were confronted by a major menace to the expanding industry they depended upon for livelihoods. State agencies that might be turned to then were practically non-existent.

Eight years passed, with the problem growing more and more puzzling. In 1893, however, light began to dawn on the situation. D. H. J. Webber of the United States Department of Agriculture, was assigned to Florida for a study of citrus rootstocks and varieties. At Crescent City, he noticed a high mortality of young whiteflies.

Microscopic examinations disclosed that the destruction of the insects had been due to a fungus, which killed them off in quantities. Nature had a remedy for the pests she had sent, after all. The friendly fungus was named **Aschersonia aleyrodes** by Dr. Webber. Hope ran high among growers that white flies were doomed.

Eventually they were to be, but not "now." The fungus could not move of its own accord, from tree to tree. Dew, insects, rain and wind scattered it in a measure but not as widely as was needed. Nature would require some assistance, it became evident.

Leaves bearing the fungus were taken from trees and transferred to other trees that had none but were infested with whiteflies. The method worked on a small scale, but it was slow and cumbersome. Whiteflies had become numerous, and were increasing rapidly.

Whiteflies took a back seat in capacity for harm when the "big freeze" of 1894-95 came along, temporarily to wreck the citrus industry in the state. With the rebuilding of the groves, the pests again loomed as a major incubus to profitable fruit growing.

In 1908, Dr. H. S. Fawcett, plant pathologist of the Florida Agricultural Experiment Station, found that the fungus would thrive on cooked sweet potato. Methods of scattering it were worked out by Dr. E. W. Berger, then Station entomologist.

Since that year cultures of the fungus have been grown annually under the direction of Dr. Berger, now with the State Plant Board, and supplied to Florida citrus growers. Preferably they are distributed in the groves during the summer rainy season.

Sam: "You look all in today, Bill. What's the trouble?"

Bill: "Well, I didn't get home until after daylight, and I was just undressing when my wife woke up and said, 'Aren't you getting up pretty early?' In order to save an argument I put on my clothes and came down to the office."

Bride: "I would like to buy an easychair for my husband."

Salesman: "Morris?"

Bride: "No, Clarence."

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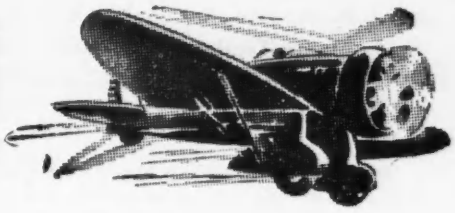

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Florida

Control of Mole Crickets

J. R. Watson, Entomologist, Florida Experiment Station, Explains Tendency of Mole Crickets To Increase In Florida and Tells of Measures Necessary to Bring Them Under Control . . .

Mole crickets are increasing in Florida and in certain sections of the state are one of the worst pests with which the trucker has to contend, says J. R. Watson, Entomologist, Florida Experiment Station. We have four species of these insects. Three of them are native and mostly confined to damp soils; but the fourth species has been introduced from the West Indies and is therefore known as the West Indian mole cricket, and frequently called by its Spanish name of Changa. This is by far the worst of the mole crickets and is not confined to damp soils but will work in thoroughly drained soils as well — even in those which are very dry. Fortunately, this mole cricket is not found in all sections of the state but in those sections where it has become thoroughly established it is a very severe pest.

These insects get their name "mole cricket" from their habit of burrowing in the ground, very much like a mole. Their burrows, of course, are very much smaller and nearer the surface than those of moles. The front feet of mole crickets are modified into wide, shovel like structures resembling much those of moles. In color and appearance, however, they are entirely distinct, having six legs and no fur as they are true insects. They are vegetable feeders, often coming out of their burrows at night to feed on tender vegetation. They are particularly destructive to seed beds and other young plants.

The treating of the soil with sodium and ammonium sulfate, as advised for root-knot, will eliminate the Changa from the soil, but of course will not prevent their prompt return. However, a board, or better yet, a piece of metal such as sheet iron, sunk in the ground to a depth of four or five inches, and projecting above the ground to about an equal height, will usually prevent their entrance into a treated bed. A ditch filled with naphthalene or other repellant will have the same effect. On larger areas a resort to poisoning will be cheaper. Plow the seedbed as long in advance of planting the crop as is practical, and when the mole crickets have become good and hungry distribute the poisoned bait. The most effective bait that we have tried consists of 25 pounds of laying mash thoroughly mixed with a pound of paris green and a quart of molasses and a pinch of salt, and then moistened with enough water to make it damp but not sloppy. In other words, the well known grasshopper bait is used but with egg mash substituted for the bran. Any of the commercial egg mashes containing more or less dried milk seem to be more or less effective.

A bait which has been much used in the West Indies substitutes for the egg mash 12½ pounds of rice and 12½ pounds of bran or a cheap grade of wheat flour. This is, of course, a cheaper bait than the egg mash. The bait of egg mash has given good control in seed beds where the plants were attractive enough, but of course in the case of all baits of this kind was more effective when there is no other vegetation on the ground. It should be put out whenever serious damage from mole crickets occurs, and since mole crickets feed at night should be put out in the late afternoon or evening so that it will be fresh during the night. This bait, of course, will be effective against grasshoppers and crickets as the common grasshopper bait is also made up of bran.

The control of mole crickets is not easy and will call for constant vigilance on the part of truckers. In plowing infested land it is an excellent idea to let chickens and other domestic fowls follow the plow. They will pick up many mole crickets. Frequently plowing is one of the cheapest ways of reducing an infestation of mole crickets in soils. In the spring of the year when they are breeding actively they will go to lights quite readily. A lantern suspended over a dish of kerosene will catch many of them.

Adventures IN CITRUS

By Helen Carr Payne
Sanford, Florida

Most people, especially in northern markets, think only of grapefruits and oranges, when citrus fruit is mentioned. However, there are smaller members of the citrus family, just as healthful and fully as delicious.

Of course, there is the lemon, unequalled for flavor. Everyone is familiar with its uses in lemonade, pies, desserts, sherbets, cold drinks and gelatine salads. Most of our supply comes from Italy, but both California and Florida now grow large lemons, which are taking their place commercially.

Just as delicious in most uses is the lime. It makes an even more delicious drink than the lemon and is unsurpassed in iced tea and other drinks.

There is a tiny yellow lime, the size of a large marble, and a larger green variety called the "Persian" Lime. It is about the size of a lemon and its flavor in limeade is unsurpassed.

Then there is the satsuma, an early orange, ripe in October and November. Its skin is easily removable with the fingers. It is orange in color when ripe.

The real snob of the orange family is the tangerine, called the "kid glove" orange. It is deep orange in color and is shipped from November to April. It has a flavor all its own and the sections are easily separated. It is the children's favorite.

The tiniest of the citrus family is the kumquat. It is about an inch long, oval in shape. It has a sweet rind and rather bitter center, and is eaten whole. Its flavor is unique. If you have once tasted this little fruit, you will want it again and again.

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This fine state institution which received its inception at the hands of the State of Florida 50 years ago has served a constantly and increasingly important function every year of its existence.

Having no private axes to grind and no personal motives to foster this organization has adhered strictly to its primary function of finding out facts concerning the agricultural activities of the state, solving the answers to disease and pests which attacked our trees and crops, studying the effect of various fertilizers and other ingredients upon the plant life of the state.

— And then passing this information on without favor or prejudice to that vast army of growers who go to make up the state's most important industry.

My own experience with this organization in the past I am certain is only the reflection of that of hundreds of others interested in citrus and agriculture, and in my own case as in that of others I am certain that factual knowledge they have presented, the generous assistance and counsel this fine group has offered, has proven invaluable.

The basis of confidence reposed in the Experiment Station is founded upon the knowledge that they do no guess work. When they pass on their findings — they represent proven facts.

Our own business, the manufacture and sale of Extra Value Brands of Fertilizer is operated on exactly the principle outlined above — we do no experimenting with our customers' groves or crops . . .

G. D. SLOAN, President

Fla. U. Agricultural Experiment Station

Making State Again Blossom As A Rose

Rural Research As Carried On By State Experiment Station Aids In Task and Also Stimulates More General Recognition of The Value of Beauty to Florida — Many New Plants Grown in State . . .

Discovery of Florida first recorded in history occurred on Easter Sunday. Honoring the day, Ponce de Leon, the Spanish adventurer who had landed on the shores of the new country, named it "Pascus Florida," meaning "Feast of Flowers." Explorations of the territory revealed native ornamental and blooming plants in great profusion and the European visitors were charmed with the natural beauty. Settlement followed in due time and the section became known as "The Land of Flowers."

Botanists and naturalists having world-wide reputations came to study the abundant flowers. Books were written by some of them describing the rare and valuable species they found within the borders defining the present Florida. Spaniards, French and British, who successively acquired rights to the territory, were alike loud in praise of the attractive scenery. Settlers of the early days planned their estates and plantations for its preservation and enhancement.

Landscape and terrain of the principal areas became increasingly repellent, however, as commercial activities attained dominance. Forests filled with towering trees fell before the lumberman's axe or succumbed to the turpentine operator's tapping. Fires annually devastated vast cutover acreages, sacrificing a wealth of vines, shrubs and plants. Cattle were grazed by the hundreds of thousands, subsisting on other vegetation when the grasses gave out.

Lands were ultimately abandoned in large part, without attempt at reforestation. Trees and shrubs of the flowering type were allowed to die, without replacement. Grasses came to be neglected on the grounds of many residences. Beliefs grew up that Florida soil and climate would not support ornamental plantings or lawns. Newcomers were eventually told that roses could not be grown in the state.

"Why not?" inquired the Florida Experiment Station. Research was instituted and it was found that no fundamental reasons existed for this belief. Roses could be raised, and a host of other flowers, if only attention was properly given to varieties, root stocks, soil, spraying, pruning, fertilizing and so on, in keeping with the essential requirements necessary where sub-tropical conditions prevail. Rewards for consistent endeavor were shown to be rich.

Experiments were conducted, and the results published, which disclosed the best methods in all these respects. Problems continued to arise, of course, as the land became more thickly populated and artificial elements were introduced. Insect depredations were particularly a source of trouble. Investigative work at the Station quickly followed whenever these reached serious proportions and in most instances the solutions followed with a minimum of harmful delay.

College of Agriculture cooperation was extended in a highly helpful way. Flower gardens were developed in its handling of the matter which were visited by growers from far and near. University of Florida campus confines thus were made a demonstration center for the reviving floral features in the state's upbuilding. State Agricultural Extension Service staff members carried the message into all sections.

Roses were by no means the object in all this study and practice of flower growing. Plants of many kinds, shrubs in infinite variety and vines numbered by the scores were dealt with at the same time. Introduction of new and superior types was by no means neglected. In the widespread and comprehensive coverage of the undertaking, the range finally was all the way from Azaleas to Zinnias.

Gardeners, amateur and professional, nurserymen, seedsmen and like tradesmen contributed to the endeavor. Values of an economic nature involved in the undertaking were far broader than was represented by the production from the commercial enterprises. Civic beauty was long ago recognized by State Experiment workers as a major asset of rural Florida.

Beautification of highways grew into a far flung objective after Florida had built the present hard road system in part. State and community organizations were formed to advance and guide the effort in that direction. Experiment Station records, resources and specialists again were largely depended upon for the basic information needed.

In the latter days of all the foregoing labor for making the state again beautiful in keeping with the name and the original plant life profusion, it has come to pass that many Floridians think concerning the Agricultural Experiment Station and its leadership much as the Prophet Isiah proclaimed when he said:

"The wilderness and the solitary place shall be glad for them; and the desert shall rejoice, and blossom as the rose."

Visitors from the North exclaim to home-folks, too, in the words of Richard Watson Gilder:

"O see where wide the golden sunlight flows—
The barren desert blossoms as the rose."

Hotel Proprietor—"Do you want the porter to call you?"

Guest — "No thanks, I awaken every morning at seven."

Hotel Proprietor — "Then would you mind calling the porter?"

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50 Years of lighting the way for agriculture

THIS YEAR marks the golden anniversary of the establishment of farm research in Florida. The scientists connected with the Florida Experiment Station and the State College of Agriculture have made many contributions to Florida agriculture, horticulture and farm management during these years.

We gladly pay tribute to the painstaking, thoroughgoing efforts of all connected with the Florida Experiment Station in lighting the way for Florida agriculture over so many years.

We have had the opportunity to cooperate with Experiment Station scientists in many tests for the purpose of proving better fertilization methods and materials for Florida crops. We know of many instances where such efforts have been of invaluable aid to Florida growers.

For more than thirty-five years, we, too, have made research in field and laboratory the backbone of GULF Service. That is why, today, we can offer growers of every commercial crop in Florida, fertilizers that are actually keyed to soil and crop needs in different sections of the state. That is why, too, we invite you to consult with the Gulf Field Man in your section to determine the most economical fertilization program to fit your needs — confident that GULF Brands of Fertilizer will prove more satisfactory and economical in the long run.

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THE GULF FERTILIZER COMPANY

Tampa and Port Everglades

BUILDING FLORIDA AGRICULTURE FOR FIFTY YEARS

(Continued from page 5)

ers, and the state's business firms get this amount directly or indirectly from the farmers. The state's research has kept entire farming industries from being wiped out, and has helped to start others that never before existed in this State or this Nation.

Since our time is limited, let's go right away into some facts about the Station and its work during the last half century. It has published 325 bulletins and 520 press bulletins containing information on an extremely wide variety of topics. These publications have been made available to Florida farmers and growers, and in many cases have resulted in widespread changes in this manner and has become so completely a part of the daily work of growers and planters that the original source from which the information came has been entirely lost to sight.

Turning now to research department, we have first **animal husbandry** because it is first alphabetically.

Cattle on a thousand hills in Florida, could have been counted at many times since Hernando de Soto, the Spanish explorer, brought the animals to the territory, about 1540. (Some highway travelers are more inclined to question whether the state has a thousand hills than that its cattle are roaming.) Cattle have been important in Florida's agriculture for nearly 400 years, yet it is only in relatively recent years that the industry has made noteworthy advancement. At last the barriers to progress in cattle development are being broken down by research.

Experiment Station animal husbandmen have found that in widespread areas of Florida the forages produced are lacking in certain mineral elements, such as iron and copper, calcium and phosphorus. For instance, salt-sick is an age-old problem which has plagued cattle in some sections, necessitating the moving of animals to healthy ranges at regular intervals and resulting in losses of nearly $3,000,000 annually to cattlemen. By a simple little contribution of the Experiment Station, after it was learned a few years ago that the trouble was due to a deficiency of iron, copper and perhaps cobalt in the forage crops grazed by the range animals, it has been possible to stop the ravages of this trouble. Cattlemen now simply allow their animals to have access to a recommended mixture of salt, iron, copper and cobalt.

Similarly, phosphorus deficiencies in range cattle and calcium shortages in the feed of dairy cattle have been corrected to the tremendous advantage of the owners.

Studies of feeding problems have opened the way to the utilization of by-products (otherwise largely wasted) from citrus canning factories, and have brought supplemental sources of silage into the realm of cattle feeds. Following the Station's discovery, only a few years ago, of a process for making feed out of citrus waste products, there are now six citrus pulp mills in the state: Last season they made 15,000,000 tons of citrus pulp feed, giving dairymen another good feed, citrus people an extra income, and business an added punch.

Only quite recently the Experiment Station has tested shark liver oil, and found it to be almost seven times as potent of Vitamin A as ordinary or natural cod liver oil. It is now widely used in feeding poultry, dogs and other animals. And there is a shark industry off the coasts of Florida. The fishermen, as usual can't catch enough to supply the demand of the shark liver oil factory. And the shark bodies are made into meal which is used as feed or fertilizer, the hides are used in making leather which wears like iron.

An Experiment Station worker discovered a cause of leukenia and paralysis in fowls, two troubles which have baffled scientists for many years. Considerable information has been accumulated on best practices for feeding and managing poultry for profit.

Swine sanitation has been shown as efficacious in preventing numerous parasites which infest hogs and enabling the farmer to raise more healthy, fast growing hogs. Here again minerals have been found necessary in the feeds.

One doesn't often think that sheep raising in Florida's warm climate would be profitable, and it has not been until recent years. The branch Experiment Station at Quincy has cooperated with the U. S. Department in introducing the Columbia breed of sheep, has found how to control serious parasites that almost wrecked the project, and has shown that breeding the Columbias to native sheep gives a cross-breed with hardy characteristics of the native and wool and meat producing ability of the Columbia. Wool clips of the natives average around 5.1 pounds, of the crosses around 11.7 pounds.

Next, let's look for a moment at the field of chemistry and soils. When the drainage work in the Florida Everglades was completed to the extent that much land in the area was available for cultivation, the hopes of those sponsoring the project received a rude jolt. It was anticipated that the millions of acres of peat soils would be a veritable gardner's paradise. Alas, however, it was soon found that only small areas of the muck adjacent to Lake Okeechobee would produce crops.

The Everglades branch Experiment Station came into existence, and its chemists and plant specialists set themselves assiduously to the task of finding out the trouble, remedying it and making fertile muck areas productive. They discovered that the soils were in need of copper and manganese, and when these so-called rare elements are added as fertilizer, bounteous crops can be harvested.

Florida has been prominent for many years in the American phosphate mining industry. Undoubtedly, early Experiment Station work greatly stimulated the phosphate mining industry in the state. Many analyses were published, 387 of them at one time in 1890, and these furnished the basis upon which in numerous instances early mining operations were undertaken; moreover, the manufacturing of phosphoric acid fertilizer materials was investigated and much information upon which bothing mining and manufacturing operations were based was supplied.

Particularly in recent years has research shown the value of other rare elements in overcoming various crop troubles, such as white bud of corn, bronzing of tung trees, frenching of citrus, crack sten of celery, and others. Use of maganese has made possible the production of tomatoes on marl soils of the East Coast without the use of stable manure, which was becoming difficult to obtain in sufficient quantities.

Some several years ago thousands of chemical analyses showed that Florida vegetables contain amounts of iodine comparable to vegetables grown in other seacoast areas.

The Florida Station was among the first to use the spectagraph in determining amounts of trace elements contained in plant materials and in fertilizers. This machine has enabled workers to determine the presence of even minute quantities of various elements in plant materials, and to suggest the use of trace elements in fertilizers when these elements were shown to be present in the plant materials in only small quan-

(Continued on page 24)

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Cercospora

Cercospora Leaf Spot . . .

Erdman West, Mycologist, Florida Experiment Station, Discusses Disease Which Has Proven Bane To Many of State's Most Attractive Ornamental Shrubs and Offers Suggestions As To Its Elimination . . .

One of the most valuable ornamental shrubs, **Pittosporum tobira,** is well known to many Florida home and grove owners. It has been especially useful in the northern half of the State where its dense green bushes are equally as attractive in winter as they are in summer. As its claim to beauty is based on the dark green color of its leaves, anything that spoils this even coloration is undesirable. The fungus disease, Cercospora leaf spot, is often a very serious offender in this respect.

The disease appears first as a small yellowish green spot not over one-eighth of an inch across. The yellow color gradually becomes more prominent and the spot increases in size until it is one-quarter inch or more in diameter. By this time the shape of the spot appears square, or at least angular, because its margin is delimited by the larger veins of the leaf. No further increase in size is likely to occur but the color gradually becomes brownish-yellow. Mature leaves anywhere on the bush are susceptible to the disease. Very young leaves have not been found affected but the trouble appears soon after full size and the normal "firm" texture of the leaf is attained.

Affected leaves may be restricted to one side or portion of a plant, or they may be evenly scattered over the whole bush. Often leaves bear only one of the angular yellow spots but in other instances four or more may occur. In very severe cases only a few green flecks may remain between the numerous diseased areas. Such badly affected leaves soon fall from the bush. Continual defoliation from this cause weakens the plant.

The cause of the Pittosporum leaf spot disease is a parasitic fungus, a species of Cercospora. Its growth is not evident on the upper side of the leaf and not very conspicuous on the lower side. On the under side of spots that have reached the yellow stage a gray downy or wooly fuzz may be seen. These fine threads are the fruiting structures of the fungus. Tiny filament-like spores are produced in abundance on these areas and are easily blown about, spreading the disease to new leaves or to new plants.

During the dormant winter period, the fungus hibernates on the spots on the old leaves. When growth of the host starts in spring, the new leaves are infected from the affected portions of the old ones. Whether the fungus produces spores of any sort from fallen leaves is not yet known. In the southern part of the state, the fungus is active probably every month in the year.

The control of the disease is not difficult though eradication is out of the question since the fungus is so widely distributed in the State.

The use of any good copper-bearing fungicide is satisfactory for the control of the disease, but the use of a stainless spray is desirable from the esthetic standpoint. Bordeaux mixture, 3-3-50 strength, has always proven effective under all conditions, but it stains the foliage badly. Basic copper sulphate at the rate of 1½ pounds to 50 gallons of water may be substituted with less discoloration. Ammoniacal copper carbonate will leave no visible residue but is a little less effective in the control of the trouble. The spray may be applied any time but it is most effective as the newest flush of growth is maturing but has not become infected. Applied at this time, the fungicide acts as a prophylactic on the young growth and prevents the spots on the older leaves from maturing spores. Since most of the fungus is on the undersides of the leaves care should be taken to cover these thoroughly. One application is frequently enough to check the disease, but better results will be obtained if a second application is made two or three weeks later. Be sure to spray the whole bush thoroughly.

Warden: "What kind of exercise would you like to take?"

Condemned Man: "I'd like to skip the rope."

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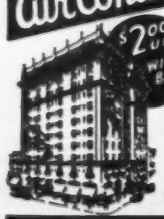

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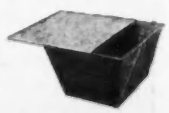
For 25 years National-Riverside Heaters have saved millions of dollars to citrus, deciduous and truck growers. Low in Cost and High in Efficiency... Write to



9 Gallon Junior Louvre Heater

National-Riverside Co.

P.O. Box 925, Tampa, Florida

3 and 9 Gallon Smudge Pot

FIFTY YEARS OF ENTOMOLOGY RESEARCH

(Continued from Page 3)

season. Previous to this work, rotation of crops was recommended, but this took many years and was often ineffectual because the rotated crops, although not badly injured by the worms, harbored enough of them to carry on the infestation. This applies also to most weeds and grasses. The only common cover crops which have proven to be absolutely immune are velvet beans and the crotalarias. For this starvation method the crotalarias are more satisfactory because of their right habit of growth and immunity from pests that destroy the stand as the velvet bean caterpillar does the velvet beans.

Along lines of chemical treatment of the soil, cyanamid received early attention. It was demonstrated that this material helps reduce the number of nematodes in the soil as well as aiding the plants in overcoming the effects of the pest, but it has never proven feasible as an eradication measure. For the treatment of seedbeds where complete or nearly complete eradication is desired, the use of steam and hot water has long been advocated, but in most of our trucking fields these standard remedies are not available, or are too costly.

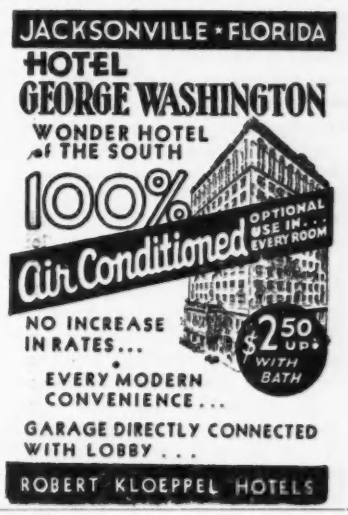
Although the preliminary work was done in California, the Florida Experiment Station was the first to develop on a large scale the fumigation of the soil by means of hydrocyanic acid gas, liberated in the soil by saturating it with a solution of sodium cyanide and then with a solution of ammonium sulfate. These two substances reacting together in the soil give off hydro-cyanic gas, which is the killing agent. Proper dosages have been worked out for different soil types.

The advantage of this method is that it leaves the soil immensely rich in nitogen and the plants make wonderful growth on treated soil, although the process is too expensive for anything but seedbeds and back yard gardens and other particularly valuable pieces of land.

At the present time much attention is being given to the effect of mulching on root-knot nematodes. The host plants of this worm have also been studied and the comparative resistance, susceptibili y, or tolerance to the worms by different plants. This is the only station where any attention along this line has been paid to annual ornamentals.

In addition to the above, much work has been done on truck and garden insects, such as strawberries, tomatoes, peppers, etc. For the pepper weevil it has been demonstrated that a thorough clean up after the picking season is over gives very thorough control and promises ultimate eradication of this pest.

Since the establishment of the station, insects of pecans have received much attention.



Use UREA NITROGEN

and produce a profitable crop

DU PONT

"Uramon" Fertilizer Compound
(42% Urea Nitrogen)

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Urea-Ammonia Liquor
(20% Urea Nitrogen)

● Du Pont UREA NITROGEN resists the leaching action of heavy rains. It leaves no harmful residue in the soil—is but slightly acid-forming—and is always completely available.

See that the fertilizer you buy contains Urea, the soluble organic nitrogen. A copy of our booklet, "Urea—Triple Plus Nitrogen," will be sent immediately on request. For further details about Urea Nitrogen, write us or your fertilizer manufacturer.

E. I. DU PONT DE NEMOURS & CO., INC., Ammonia Dept., Wilmington, Del.

BUILDING FLORIDA AGRICULTURE FOR FIFTY YEARS

(Continued from page 20)

tities, or to be absent altogether.

Entomology or study of insects is another important subject in Florida. "Fight fire with fire," has long been an axion. Fight insect with insect or fungus, likewise, has become a maxim of workers in entomological research at the Experiment Station. Consequently, natural control of harmful insects now saves Florida citrus growers thousands upon thousands of dollars every year. Pests which the grower largely can keep under control through the use of beneficial fungi and insects are the citrus whitefly, cottony cushion scale, mealybugs, and citrus aphids. Not infrequently, the beneficial insects were brought in from the other side of the world to aid Florida growers.

Sandy soils of Florida are especially subject to infestation by small eelworms or nematodes which attack the roots of certain crops, causing root-knot and resulting in severe damage to the crop. A very simple method for reducing the number of nematodes in the soil was devised many years ago by an Experiment Station entomologist. Truck growers simply keep the land cultivated during the summer, but grow a crop which will not be attacked by the nematodes. Result, the nematode eggs hatch and the young starve to death before the winter truck season arrives.

Flowering plants and commercial shrubs add greatly to the beauty of Florida homes and many cities and towns are emphasizing their importance in making the state more attractive to winter visitors. Methods of controlling some of the more important insect pests of these plants have been found and studies have been made on the effects of different kinds of insecticides on these plants.

The gladiolus thrip made its appearance in Florida a few years ago and seriously threatened the growing of these bulbs. Effective methods of controlling this pest have been devised by entomological workers.

Scale insects, whiteflies, and rust mites are a constant menace to the citrus industry. Entomologists have devoted much thought and effort to this problem and have found insecticides that give effective control of these pests. The utilization of this knowledge yearly saves the citrus growers of the state thousands of boxes of fruit that otherwise would be lost.

A few years ago the pepper weevil was discovered in some of the pepper fields of Florida's Gulf Coast. In some fields it was destroying a very large portion of the crop and it looked as if the growing of peppers in that section would be impossible. Entomologists working on the problem soon found that a thorough clean-up of the pepper fields after the crop is harvested will reduce the weevils to such a low level that they will cause little injury.

Through poisoning methods devised by entomologists, growers are now able to control, easily and effectively, mice in their watermelon fields. These rodents sometimes do considerable damage by destroying seeds before they sprout, and make it difficult to obtain a stand.

In the realm of **field crops,** again the Station and the United States Department of Agriculture have gone to the ends of the earth seeking and finding new crops adapted to Florida. Through the gates of the Plant Introduction Garden on the Experiment Station grounds have come many plants that now occupy places of importance in the economic plant life of this state. Among these are crotalaria, centipede grass, bahia grass, dallis grass and others. In addition, velvet beans, a crop growing naturally and formerly thought to be poisonous, have been developed into a staple cow feed and are grown throughout the South as a result of the Florida Station's investigations.

By breeding and selection, new strains and varieties of old familiar crops are being developed which, because of their better adaptation to Florida conditions, return greatly increased yields or possess other outstanding qualities which make them useful. Notable progress along this line has been made with corn, peanuts, cowpeas, oats, and sugar cane.

Tests have shown existing strains of corn, cotton, soybeans, and other crops best suited to Florida conditions, and the state's farmers have been enabled to augment their yields by growing the best varieties. Field tests have shown the best and most economical fertilizing practices, also.

Field work with pasture grasses and clovers has greatly aided cattlemen and dairymen in growing more feeds, thus saving money that has been spent on imported feedstuffs. During the winter of 1937-38 its tests indicated that clovers can be grown in this state if lime, fertilizer, and moisture are available in sufficient quantities. Reports now indicate that hundreds of acres are being sown to clovers this winter to provide winter and spring grazing. Better pastures and improved pasture management have become widespread in Florida also.

Established in 1926 as a result of federal appropriation, the departments of **agricultural economics** and **home economics** immediately undertook studies of important problems.

Data on carlot movement of truck crops were compiled and studied to ascertain and make known the principal states and foreign countries which compete with Florida in truck crops production.

Detailed cost accounts have been kept with the cooperation of a number of citrus growers to determine costs, returns and profit of citrus production of fruit and age of trees. Investigations have been made of the packing house costs of citrus, and of the marketing costs by various methods of shipment and refrigeration. Citrus prices have been studied by size and grade of fruit on several of the leading markets. All of these studies were to enable citrus producers to reduce expenses, or to increase returns. Studies of farmers' cooperative associations have revealed the strong and the weak points of this type of business organization.

Farm management surveys have revealed the outstanding principles determining the financial success of farmers as being size of business, production per unit, and price per unit. Contributions have been made enabling Florida growers to claim and procure more equitable freight rates, another saving.

Outstanding home economics studies have concerned nutrition, vitamins, and food preservation. This work has stimulated interest in nutrition and the use of protective foods, and a number of so-called thriftless and lazy people have been brought out of the doldrums by following their diet recommendations.

The home economics department has shown that Florida oranges are an excellent source of Vitamin C.

In the field of **horticulture,** the Experiment Station has given to Florida and the South the tung oil industry; it has determined that citrus frenching and tung oil bronzing can be overcome by the use of zinc compounds; it has conducted research which makes it possible to store oranges for two or three months and keep them in good condition; it has isolated the cause of bitterness developing in orange juice when it stands for several hours, and thus the department has laid the foundation for the development of a fresh

orange juice industry.

Each of these accomplishments has a direct effect on the financial income of Florida growers, and consequently is of value to the entire population.

Plant disease investigations of the Experiment Station are saving millions of dollars annually to Florida growers. Both growers and shippers of principal crops are in position to recognize this increase in net returns as a result of plant disease control, because many of them have had the experience of growing the crops before and after control measures were developed. Indeed, several crops could not now be produced in the state at a profit had not these studies been made and control measures developed.

Certain diseases of tobacco, tomatoes and watermelons caused by organisms that inhabit the soil have been controlled by developing strains of these crops that grow in spite of the disease. By this method the cigar-wrapper tobacco crop, a $1,500,000 industry, was saved to the state. Control of a somewhat similar disease of potatoes, known as brown rot, has been accomplished by treating the soil with sulphur and lime. Brown rot was estimated to have caused a loss of $117,000 in 1935 to potato growers in the Hastings area. By the simple expedient of applying sulphur to the soil during the summer to induce an acid reaction, the parasitic bacteria in the soil are killed. Then before potatoes are planted in the winter, lime is applied to make the soils again favorable for potatoes. It is not necessary to repeat this every year.

Large savings have been effected by controlling diseases of some crops that are introduced on seed and plants that are brought into the state for planting. Treating cucumber seed with bichloride of mercury before planting them was found to control angular leaf spot, thereby saving the growers $100,000 annually. Furthermore, methods of seed treatment have been developed that greatly reduce the mortality of seedlings of certain vegetable crops in the seedbeds. An even greater saving was effected for the potato growers at Hastings last season by discovering the source of a new disease, bacterial wilt and soft rot, and locating a stock of seed relatively free of this destructive disease. Similar aid has been given strawberry growers in the Plant City area by discovering that the nematode causing the "crimp" disease was introduced on the plants purchased in certain other states.

The annual toll formerly taken by foliage and fruit diseases of many crops has been greatly reduced by the development of suitable spray programs. Outstanding accomplishments along this line are methods for control of scab and melanose of citrus, early blight of tomato, late blight of potato, downy mildew of cucumber and black rot of grapes. By supplementing spraying with after-picking treatment of the fruits, stem end rots of citrus and Phona rot of tomatoes have been effectively reduced.

Blight of citrus trees, a disease long puzzling to growers, was found to be caused by a lack of water and plant food due to unfavorable soil conditions.

Other diseases of all major crops in Florida have received attention, and control measures are known or are in the process of development for most of them. New disease problems arise with the introduction and cultivation of new crops and because of the purchase of seed from new sources.

In closing, let us remind you simply that the financial and economic structure of Florida today rests in large measure upon agriculture in its numerous forms. From the very beginning this has been true, and it will always be so, for the state's future is inseparably tied up with the wise and proper use of land. The contributions of the University of Florida's Agricultural Experiment Station have been a tremendous factor in the development of the commonwealth. Without them the vast potential resources of the state would not have been developed to their present value. Doubtless even greater developments awaits them in the future.

Business is good when we are getting it — and bad when it goes to our competitors.

NATURAL CHILEAN NITRATE OF SODA

•

CHILEAN NITRATE is the only natural nitrate. It is guaranteed 16% nitrogen. And it also contains, in natural blend, small quantities of other plant food elements.

Many of these elements such as iodine, boron, calcium, zinc, copper, iron, manganese and magnesium, in addition to nitrogen, phosphorus and potassium, are necessary to plant life for normal good health, growth, quality and yield.

Therefore, Natural Chilean Nitrate is agriculturally valuable both as a source of nitrate nitrogen, and to furnish, or build up a reserve of other plant food elements naturally blended with it.

Use Natural Chilean Nitrate—take advantage of its quick-acting nitrogen and its many protective elements. It is well-suited to your crops, your soil and your climate.

NATCHEL SODA, YASSUH!

"Dat's de stuff," says Uncle Natchel

EDITORIAL

THIRD GRADE FRUIT

(Continued from page 10)

late consumption and tend to hold up the price of first and second grade fruit. It also will have a permanent effect by creating public confidence in the quality of citrus fruits—something which has been sadly lacking at certain times in the past.

Eliminating the shipment of third grade fruit may seem like a big order — but it is worth trying, and if successful it will be one of the greatest things which could happen for the industry.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of THE CITRUS INDUSTRY, PUBLISHED MONTHLY AT BARTOW, FLORIDA, FOR OCTOBER, 1938

COUNTY OF POLK.

STATE OF FLORIDA,

Before me, a notary public in and for the State and county aforesaid, personally appeared S. Lloyd Frisbie, who having been duly sworn according to law, deposes and says that he is the Business Manager of The Citrus Industry, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 411, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher — Associated Publications Corp., Bartow, Fla

Editor — S. L. Frisbie, Tampa, Fla.

Business Manager — S. Lloyd Frisbie, Bartow, Fla.

2. That the owners are:

Associated Publications Corporation, Tampa, Florida.

S. L. Frisbie, Tampa, Fla.

S. Lloyd Frisbie, Bartow, Fla.

Loyal Frisbie, Bartow, Fla.

B. L. Gable, New York, N. Y.

F. L. Skelly, Orlando, Fla.

B. W. Skinner, Dunedin, Fla.

F. P. Wall, Mansfield, Ohio.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

American Fire & Casualty Co., Orlando, Fla.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him

S. LLOYD FRISBIE,
Business Manager.

Sworn to and subscribed before me this 3rd day of October, 1938.

(SEAL) CLYDE GIBSON,
Notary Public.

(My commission expires 2-27-1939)

Son (entering office): "Well, Dad, I just ran up to say hello."

Dad: "Ooo late, my boy. Your mother ran up to say hello and got all my change."

'Most anyone can bring back one order; it takes an artist to repeat.

CLASSIFIED

Advertisments

The rate for advertisements of this nature is only five cents per word for each insertion. You may count the number of words you have, multiply it by five, and you will have the cost of the advertisement for one insertion. Multiply this by the total number of insertions desired and you will have the total cost. This rate is so low that we cannot charge classified accounts, and would, therefore, appreciate a remittance with order. No advertisement accepted for less than 50 cents.

WANTED — Two thousand sweet seedling root stock, lining-out or better. H. M. Sherwood, Fort Myers, Florida.

ROSES—Two year, fieldgrown, everblooming varieties. Fall planting best. Free catalog. Tytex Rose Nurseries, Tyler, Texas.

ALYCE CLOVER SEED. Ripe and cleaned. Ideal cover and hay crop, Write for information. P. E. Synder, Box 866, Lakeland, Fla

SEEDS — ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings lineout size. De Soto Nurseries, DeSoto City, Fla.

HARDIN'S SPERRYOLA Lemon, a profitable adapted commercial variety for all sections. Hardy, prolific grower and producer. Limited number choice trees. Hardin Nurseries, Box 68, Lakeland, Fla.

THRIFTY TREES and budwood from record performance Perrine Lemon parents. Persian Lime and other citrus varieties. DeSoto Nurseries, DeSoto City, Fla.

CITRUS BUDS AND SEEDLINGS Valencia, Jaffa, Hamlin, Pineapple Orange, Marsh Seedless Grapefruit, all buds on sour orange rootstock, from special budwood and stock selection. Also, sour orange seedlings ready for transplanting. Nursery near Blanton, Pasco County. R. P. Thornton, Copothorn Nursery, H. S. (Rox) Pollard, P. O. Box 2880, Tampa, Florida.

THOUSANDS of Rough Lemon Seedings, six to twenty inches high. $1.50 per hundred; $12.50 per thousand; ten thousand or more at $10.00 per thousand. Strong field grown plants. INDIAN ROCK NURSERIES, Largo, Florida.

CITRUS SEEDLINGS
Cleopatra, Sweet Seedlings, Sour Orange, Rough Lemon, Grapefruit. New low prices. Grand Island Nurseries, Eustis, Fla.

SCENIC HIGHWAY NURSERIES has a large stock of early and late grapefruit and oranges. One, two and three year buds. This nursery has been operated since 1883 by G. H. Gibbons, Waverly, Fla

SEED—Rough lemon, sour orange, cleopatra. New crop from type true parent trees. Also thrifty seedlings. DeSoto Nurseries, DeSoto City, Florida.

NEW COMMERCIAL lemon for Florida, the Perrine; proven. All residents need yard trees, keeping Florida money at home. Booking orders for budded stock for Winter delivery. DeSoto Nurseries, DeSoto City, Fla.

BUDDED trees new Florida commercial lemon, proven, thin skinned, juicy, scab immune. Also rough lemon, sour orange and Cleopatra seed and liningout seedlings DeSoto Nurseries, DeSoto City, Fla.

AVOCADOS — All desirable varieties. Haden Mangos, Persian Limes, superior budded Loquats. Coral Reef Nurseries Co., Homestead, Florida.

ALYCE CLOVER
Fresh crop, cleaned, and inoculated. Also Crotalaria Spectabilis, Intermedia, Striata. Write for new low prices. Grand Island Nurseries, Eustis, Fla.

ALYCE CLOVER, the best legume for hay or covercrop. Write for information. Hardin Groves, Box 68, Lakeland, Fla.

CHOICE Rough Lemon Seedlings 6 to 20 inches high, $10.00 per thousand. Olan Altman, Sebring, Florida.

CROTALARIA SPECTABILIS — Fresh crop, $15.00 per 100 lbs. f. o. b. Frostproof, Fla. Milton Woodley, Frostproof, Flo.

"MAIL ORDER Operator desires contact with grower of high grade avocado pears. Have interesting proposition for grower of highest quality fruit." F. R. Gardner, P. O. Box 528, Greenville, Pa.

FOR SALE—2000 Riverside No. 10 Grove Orchard Oil Heaters used only two seasons, excellent condition. 70c each, F.O.B. Marianna subject to prior sale. Marianna Fruit Company, Marianna, Fla.

CITRUS NURSERY TREES
All standard varieties and novelties, on Cleopatra and Sour Orange root. Grand Island Nurseries, Eustis, Fla.

MANURE — Stable and Dairy Manure in car lots. Write for prices. P. O. Box 2022, Jacksonville, Fla.

STANDARD varieties of citrus trees including Persian limes and Perrine lemons at reasonable prices. Ward's Nursery, Avon Park, Fla.

Radio Broadcasting

Time Table Of Radio Broadcasts Of Temperature Bulletins In Effect November 1, 1938

Federal-State Horticultural Protection Service, Lakeland, Florida — U. S. Department of Agriculture, Weather Bureau — Florida Agricultural Experiment Station.

Week Days

Morning Temperature Bulletin:

11:00 AM		WLAK
11:45 AM		WFOY
12:00 Noon		WJAX
12:00 Noon		WMBR
12:00 Noon		WRUF
12:00 Noon		WDBO
12:00 Noon		WLAK
12:00 Noon	(1)	WFLA
12:00 Noon		WIOD
12:00 Noon		WQAM
12:15 PM		WJNO
12:15 PM		WKAT
12:30 PM		WFOY
12:30 PM		WRUF
12:30 PM		WDAE
12:45 PM		WMFJ
1:00 PM		WQAM
1:05 PM		WKAT
1:30 PM	(2)	WSUN
2:30 PM		WDAE

Evening Temperature Bulletin:

4:00 PM		WLAK
4:45 PM		WDAE
5:00 PM		WJAX
5:00 PM		WRUF
5:00 PM		WDBO
5:00 PM		WLAK
5:00 PM	(1)	WFLA
5:00 PM		WKAT
5:15 PM		WFOY
5:30 PM		WJNO
5:30 PM		WQAM
6:00 PM		WMBR
6:00 PM		WMFJ
6:00 PM		WLAK
6:00 PM		WDAE
6:00 PM	(2)	WSUN
6:00 PM		WIOD
6:05 PM		WKAT
6:45 PM		WJAX
7:50 PM		WLAK
9:45 PM		WMFJ
11:00 PM		WMBR
11:00 PM		WDBO
11:00 PM		WDAE
11:00 PM	(2)	WSUN
11:00 PM		WQAM
11:15 PM		WIOD

Sunday

Morning Temperature Bulletin:

11:05 AM		WLAK
11:45 AM		WFOY
12:00 Noon		WJAX
12:00 Noon		WMBR
12:00 Noon		WIOD
12:00 Noon		WRUF
12:00 Noon		WQAM
12:15 PM		WKAT
12:30 PM		WFOY
12:30 PM		WRUF
12:30 PM		WDBO
12:30 PM		WDAE
12:30 PM		WJNO
12:45 PM		WMFJ
1:00 PM		WQAM
1:05 PM		WKAT
1:30 PM		WSUN

Evening Temperature Bulletin:

5:00 PM		WJAX
5:00 PM		WRUF
5:00 PM		WDBO
5:00 PM		WDAE
5:00 PM		WKAT
5:15 PM		WJNO
5:15 PM		WFOY
5:30 PM		WLAK
5:30 PM		WFLA
5:30 PM		WQAM
6:00 PM		WMBR
6:00 PM		WMFJ
6:00 PM		WIOD
6:05 PM		WKAT
6:30 PM		WLAK
6:45 PM		WJAX
7:00 PM		WDAE
8:45 PM		WMFJ
10:00 PM		WDAE
11:00 PM		WMBR
11:00 PM		WDBO
11:00 PM		WQAM
11:15 PM		WSUN
11:15 PM		WIOD

(1) Broadcast made only on Monday, Wednesday and Friday.

(2) Broadcast made only on Tuesday, Thursday and Saturday.

(Continued on page 20)

Time Brings Progress

Each of the 50 years during which the Florida Agricultural Experiment Station has served the growers of Florida has brought new recommendations from the station by which growers might improve their crops.

The importance of calcium and magnesium has been definitely established. Dolomite has been proven the economical material for supplying these two elements. Mixed in fertilizer or applied direct, Dolomite will show definite results.

Now!

We will gladly furnish you with full information . . .

DOLOMITE PRODUCTS
OCALA INCORPORATED FLORIDA

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DOLOMITE *improves soil condition-produces* BETTER CROPS

Co-Operation With The Grower Is Our First Consideration

There was a time in the history of the fertilizer business when the primary objective of every fertilizer salesman was to sell every customer all the fertilizer he could possibly make him buy, without regard to the individual needs of the customer's grove . . .

We would like to sell all the fertilizer it woud be possible for us to manufacture, but it is our unvarying policy to tell our grower-customers exactly what, if any, fertilizer their groves may need and urge them to use that much and no more . . .

Naturally our recommendations are made with the purpose of keeping trees in proper condition to produce the greatest possible amount of quality fruit, for inferior fruit is today a greater drug on the market than ever before. We realize that neglected trees cannot produce high grade crops so we urge our customers to keep them in the best possible condition — but without the use of more fertilizer than is actually needed . . .

This policy may tend to reduce our volume of sales, but we believe it does convince our customers that we feel our own interests are best served by our thorough co-operation with them . . .

We will gladly send an experienced field man to inspect YOUR Grove, and to offer without cost or obligation the benefit of his counsel . . .

SUPERIOR FERTILIZER COMPANY

FACTORY AND OFFICE EAST BROADWAY AT 47th STREET

Phone Y-1316 P. O. Box 1021

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